

XXIV. *Descriptions of the Nests of two Hymenopterous Insects inhabiting Brazil, and of the Species by which they were constructed.* By JOHN CURTIS, Esq., F.L.S. &c. &c.

Read February 6th, 1844.

OF the various departments in natural history which engage the attention of man, none are more interesting or more calculated to elevate his mind and to furnish him with a pure and endless source of amusement than the economy of insects. Every one who supplies any data bearing upon this subject contributes in no small degree to the advancement of natural history by augmenting the store of materials upon which true science and philosophy are based. It is the record of facts which has rendered the works of Reaumur and De Geer so interesting and invaluable.

If we look to those insects which furnish the greatest variety, sagacity, and even design in their economy, the orders of *Hymenoptera* and *Lepidoptera* will perhaps be the most highly estimated. This, however, is a subject which I will not enlarge upon here; but I am happy in the opportunity of making known to the Linnean Society two insects, whose nests are highly interesting, the one being a structure of nidus perfectly novel in the family to which the insect belongs; and the other, although similar to that of a congenerous species, differing from those which had been previously described.

For these materials I am indebted to my esteemed friend Lord Goderich, to whom they were presented, with many other curious insects, by the Right Honourable Henry Ellis on his return from a special mission to Brazil.

On looking over this collection, I saw two insects which were stated to be the two sexes, taken from a nest in an accompanying box, in which also I found a female fly: these I will forthwith describe, and afterwards enter upon the history of this remarkable animal. It is of the

Ord. HYMENOPTERA, Fam. TENTHREDINIDÆ, and Gen. HYLOTOMA of *Klug*:

but as I consider the singular furcate structure of the masculine antennæ, combined with the variations in the palpi and neuration of the wings, sufficient grounds for dividing this extensive group into genera, I have already adopted the genus *Schizocerus* of Latreille\*, to which our insect is most nearly related. If, however, the form of the palpi be of any value in generic characters, it will be impossible to include it in that genus, which is strictly the European type; I am, therefore, constrained to distinguish it by a new appellation, and I propose calling it

DIELOCERUS, *Curt.*

*Antennæ* articulo 3tio in mare furcato, piloso; in fœminâ simplici. *Tibiæ* ante apicem espinosæ. *Clypeus* profunde emarginatus. *Labrum* orbiculare (fig. *a*). *Mandibulæ* graciles acutæ, altera denticulo interno minuto (*b*). *Maxillæ* subæqualiter bilobæ (*c*). *Palpi* mediocres, 6-articulati, articulis tribus basalibus æqualibus, secundo tertioque crassis, quarto paulò minore, quinto omnium minimo quadrato, sexto gracili, haud reliquis longiore (*d*). *Mentum* subsemiovatum (*e*). *Palpi* tuberculis prominentibus affixi, breves, crassi, 4-articulati, articulo secundo latiore, tertio omnium gracillimo longitudine primi (*f*). *Labium* latum, trilobum (*g*).

If the above characters be compared with those of *Schizocerus furcatus*, the typical species of that division†, they will be found to differ so essentially, that it is scarcely possible to include them in the same genus.

1. DIELOCERUS ELLISII, n. s.

*Mas* nigro-violaceus, antennis furcatis; articulis basalibus collari facie pedibusque rufis, tarsis posterioribus fuscis; articulis basalibus albidis, alis hyalinis.

*Femina* rufa, abdomine nigro-violaceo, alis hyalinis, basi fasciâ mediâ apiceque nigris, tibiis tarsisque posticis fuscis basi albidis.

*Description*.—Violaceous-black; face, the entire pectus, including the collar, ferruginous-orange: abdomen with the centre of the segments rugose from being deeply striated: basal joint of antennæ and legs ochreous; hinder tarsi blackish, the basal joint whitish,

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\* *Cryptus*, Leach and in Curtis's Brit. Ent., fol. and pl. 58.

† Curtis's Brit. Ent., fol. and pl. 58.

the extremities of the other tarsi fuscous: wings entirely transparent, with a piceous stigma, an appendiculated marginal cell and three submarginal; the 1st very long, and receiving two recurrent nervures; 2nd cell small, slightly rhomboidal (fig. 1). *Female* rufous; 2nd joint of antennæ brown, 3rd violaceous-black; abdomen violaceous, two basal segments rough and black: wings transparent; superior with the base, a fascia across the middle including the stigma, the tip and the interior margin piceous with a chalybeous shade; inferior pitchy and chalybeous at the base and external margin and transparent round the disc: hinder tibiæ black, ochreous at the base, with a stripe of the same colour and silky on the inside: 4 hinder tarsi fuscous, excepting the basal joint, which is yellowish-white tipped with fuscous (fig. 2). The insects are drawn a trifle larger than life, but the relative proportions of the sexes are preserved.

I have dedicated this species to the gentleman to whom we are indebted for this valuable addition to the economy of insects. I considered it at first to be the *Hylotoma formosa* of Klug, whose essential character of the female is "*coccinea, abdomine nigro-violaceo, alis hyalinis, basi fasciâ mediâ apiceque nigris\**;" but in his German description he says, the two basal joints of the antennæ are red, the posterior legs black with red trochanters and thighs, and the basal portion of the abdomen is red beneath: now in *D. Ellisii* the abdomen is entirely blue beneath in the female, the base and inside of the hinder tibiæ are ochraceous, and the basal joint of their tarsi is whitish; the 2nd joint of the antennæ is also brown above. The male of Klug's species was unknown to him.

Different as the sexes are, this is not an isolated example amongst the *Tenthredinidæ*, for an equal dissimilarity is exhibited both in form and colour in *Lophyrus*†; it is, however, very remarkable that the nervation of the wings is not always precisely the same in the two sexes of *D. Ellisii*, the female not unfrequently having a transverse nervure forming an additional cell next the stigma, which increases the number of submarginal cells to four. The males seem to be rare, for amongst upwards of twenty specimens three only were of that sex.

The economy of this insect is so totally different from that of any other known species, as far as my researches extend, that if there were not the best

\* Jahrb. der Insect. vol. i. p. 248.

† Vide *L. testaceus*, Klug, and *L. Pini*, Linn., Curt. Brit. Ent. pl. 54.

evidence of the fact, I should be fearful to lay the present materials before the Linnean Society. The Bees and Wasps are well known for the skill and instinct which they exhibit in the structure of their hexagonal cells, one forming them of wax, the others of wood, and resembling coarse paper or pasteboard; but in this Saw-fly is a union of the woolly cocoon of the *Bombyx* and the cells of the Wasps. I think it has been intimated that the *Tenthredinidæ* might form a distinct order from the *Hymenoptera*; and those who entertained such a view, based on the ground that the larvæ were totally different in structure from the rest of the *Hymenoptera*, and feed, like those of the *Lepidoptera*, upon the leaves of plants, might perhaps with justice have considered the present as additional evidence of the connexion which this family holds between those orders. Caterpillars of the solitary Saw-flies, especially the larger ones, form singly oval cocoons of a very tough and leathery material upon the twigs of bushes and trees; and those which are gregarious, as the *Lophyri*, do the same, placing them irregularly, and having no common and united design, each one, as it becomes full-fed, forming an oval case of silk and gum, in which it undergoes its transformations; and it is the same with the social species of *Nemati*: but *D. Ellisii* is evidently gregarious, and the caterpillars unite and form upon the branch of a tree an oval or elliptical case (fig. 3), which is narrowed at the top, and four or five inches long. It is very uneven and roughish outside, of a dirty whitish-ochre colour, resembling in texture the gummed side of the cotton wadding employed in ladies' dresses; but it does not shine, yet I doubt not it is impervious to wet. The side next the tree (fig. 4) partakes of the form of the bark or portion to which it is strongly attached, being sometimes concave, at others flat; this surface is woolly, so much so, that it looks precisely like the coat from our sheep (*h*); along the centre of this are indistinctly defined the cells (*i*), placed transversely, and amounting to 13 in the smaller specimen examined; there were, however, 38 in all, as shown in fig. 5, which is a longitudinal section divided at right angles with the branch of the tree. These cells were piled one upon another, but all placed horizontally; they were unequal in size and irregular in form, those next the tree being quinquangular, the central ones hexagonal, and the outer ones the most irregular, some of them being nearly round or oval. In one of these cells I found a dead female saw-fly, and most of them

had the exuviæ of the caterpillar compressed at the bottom, but no shroud of the pupæ. The inequality in the size of the cells may be attributed to the smaller ones having been the residence of the males. After this examination I divided the same portion of the nest transversely at the line *k* and *l*, fig. 5, to exhibit the length of the cells, their longitudinal form and their position (fig. 6). By this section it is also ascertained in what way the saw-flies escape from their cells when they are hatched; for at the end of each cell, sometimes at one side, and as often on the other, is a circular lid (fig. *m*), formed of the same leathery material as the entire comb, the outside being crossed with the hairs, the inside smoothish, with the edge whitish and powdery, from the liquid probably secreted by the animal to soften the material during the operation of cutting, which it performs with its two sharp mandibles (fig. *b*). Through this aperture (fig. *n*) the saw-flies make their way into the woolly wall which surrounds them, forcing themselves to the side next the bark, and then crawling out into the open air. In two of the cells I found dead caterpillars (fig. 7), which considerably resemble those of the genus *Hylotoma*: they are ochreous, the head is large and horny, with a black eye-like dot on each side: the body is covered with irregular transverse rows of black warts, the hinder segments have short black spiny appendages on their sides, and the tail is surrounded by ten shining black obtuse conical spines: they have six pectoral, eight abdominal and two anal feet; at least I could discover no more in the dried specimens; but it is possible that others might be contracted and concealed, or the lateral appendages may be employed instead of them\*.

The more we reflect upon this singular nest, the more dissimilar will it appear to be from anything of the kind hitherto discovered, whether we consider its structure, or the period of the animal's existence when it is constructed; for the compound nidus is generally the work of the parents, to protect their eggs and feed their larvæ, at once affording them an asylum during three stages of their existence. Thus the bee forms its comb and the wasp its nest; the social ants also labour to form a dwelling; but in this Tenthredinous nest we find the *larvæ* uniting and forming cells in which to

\* In *Hylotoma* the number of feet in the larvæ is 20; those of *Schizocerus* are unknown,

undergo their metamorphoses. The only approach to this economy, as far as I can remember, is the nidus formed by the maggots of some of the *Ichneumones adsciti*\*, whose silken cells are placed regularly in rows. The larvæ of the saw-flies do not appear to be such skilful workmen as the bees and wasps; and it is not improbable that insects, when arrived at their perfect or imago state, may possess a greater degree of intelligence or a superior instinct than the grovelling worm, whose business it is to eat until it has arrived at a certain stage, and after various moultings as it increases in stature, when its only care is to find a secure place suited to its transformation into a chrysalis. The irregular forms of the cells will corroborate my remarks; and their outline does not appear to be the effect of design, the necessary angles which the pressure of the sides has naturally produced varying in degree and number, and this is the more evident from the partitions being much thicker in some places than in others. In a climate like Brazil, this nest is not constructed to defend the animals from a low temperature, but it may be to protect them from heavy rains, for it seems to be a covering impervious to wet; the main object, however, is in all probability to prevent the attacks of the parasitic *Ichneumonidæ*, of which there appear to be vast numbers in South America, some of them with very strong oviducts. The slightly gummy outside covering of the nest would resist a long flexible aculeus, and a short one could not reach the cells through the woolly wall which encloses them, and even if it did, the cell itself at that distance from the Ichneumon could not be penetrated by the delicate ovipositor. It may therefore be considered as one of the innumerable instances of the protection which the Author of Nature provides for the least, and what are improperly termed the most insignificant, of his creatures.

Having in my collection two species of *Schizocerus* which appear to be undescribed, I shall take this opportunity of making their characters known.

## 2. SCHIZOCERUS NASICORNIS, *Curt.*

*Mas niger*, abdomine pallidè ochraceo apice nigro, alis nebulosis, pedibus fuscis; femoribus quatuor posticis ochraceis, capite in medio dentato.

\* *Microgaster alvearius*, Curt. Brit. Ent., fol. and pl. 321.

*Description.*—Antennæ black, longer than the head and thorax, 3rd joint furcate, piceous, the rays slender, serrated and plumose, being densely ciliated on both sides: palpi long, slender and fuscous: head and thorax black and shining, the former with two elevated lines arising at the outer ocelli and forming an elongated triangle, which terminates in a little tooth or horn between the antennæ: abdomen deep yellow, margin of the 7th and two apical segments black: wings clouded with pale brown, costa, stigma and nervures piceous; superior with a large marginal cell and a small elongated apical one; three submarginal cells, the 1st and 2nd receiving each a recurrent nervure, 1st cell not very long, 2nd with the outer nervure sinuated, 3rd cell very broad; two transparent patches on the disc, leaving the base, a broad fimbria and an undefined band across the middle, brown; inferior with the centre transparent: legs lurid ochreous, four posterior thighs pale ferruginous; hinder tibiæ without spines above the apex, and piceous as well as the tarsi. Length 4 lines; horns 2; expanse 9 lines. From Brazil.

### 3. SCHIZOCERUS OCHROSTIGMA, *Curt.*

*Mas fusco-niger*, alis obscurè hyalinis costâ stigmatæque flavis, pedibus ochraceis; tibiis tarsisque posticis fuscis.

*Description.*—Antennæ black, 2nd joint straw-colour, 3rd furcate and densely ciliated on both sides: palpi long, slender and straw-coloured: head and thorax black; collar, except behind the head, ochreous as well as the hinder margin of the scutel: abdomen brown, pale at the base, black at the apex: wings yellowish, posterior margins fuscous, darkest on the costa, nervures brown, with one marginal cell terminated by a triangular one; three submarginal cells, 1st not very long, 2nd quadrate, each receiving a recurrent nervure, 3rd short and broad; costa and stigma ochreous and yellow: legs ochreous; tibiæ simple; tarsi, excepting the base of the 1st pair, and hinder tibiæ, excepting at the base, brown. Length of antennæ 2 lines; body  $3\frac{1}{2}$ ; expanse 8 lines. From Brazil.

I supposed this to be the *Hylotoma fusca* of Klug\*; but he describes the middle of the thighs as black, and his specimen being from Mexico, I am inclined to think them distinct.

Mr. Ellis having also brought home a nest constructed by a wasp, which does not appear to belong to any of the species hitherto recorded as forming similar habitations, it will prove an interesting addition to our knowledge of this remarkable family. I am led to conclude that the nest of this wasp has

\* Jahrb. der Insect. vol. i. p. 247.

not yet been noticed, from the fact that the insect inhabiting it does not answer to the descriptions of those South American species recorded by Fabricius, Latreille and other writers. The *Vespa nidulans*\*, an inhabitant of Cayenne, is not only different in colour, but it does not belong to the same section as the species before us, having the hinder portion of the thorax as well as the base of the abdomen abruptly truncated, with a very short simple pedicel: neither can it be the *Polistes morio*†, another species from Cayenne, which is entirely shining black, with the metathorax abruptly truncated behind, and the pedicel narrow and clavate. Mr. White has also described a species under the name of *Myraptera scutellaris*‡, but that species is black with an orange scutellum.

The nest also of our Brazilian wasp differs from all the others; it is most like that of *Polistes nidulans* in form; but the entrance is in the centre of the nest in the Fabrician species, and the portion by which it is suspended is three inches broad and embraces the branch, whilst ours is attached by a twig only§. By Latreille's description of the nest of *P. morio*, it seems to be very similar to ours in form and texture, but it is represented as a foot and a half in length, and as the insects are so different, it is probable that on comparing the nests other variations would be exhibited; unfortunately there is no figure I believe to guide us. The nidus of Mr. White's insect is similar in form, but it is exceedingly rugose externally, being tuberculated and covered with large excrescences. I will now describe the wasp, which may be named

#### 4. MYRAPTERA BRUNNEA, *Curt.*

Sericeo-fusca, pedibus ochraceis; femoribus genubus tibiisque quatuor positicis (nisi basi) fuscis, maculis duabus in genis flavis.

*Description.*—Neuter; silky brown, face shining, a long yellow spot on each cheek; mandibles ochreous, except at the base, the apex quadridentate, the teeth castaneous: inside of the antennæ orange beyond the middle; metathorax oval and sloping; petiole elongated, turbinate, slender at the base, the extremity not half the width of the abdomen, with a channel down the back: abdomen ovate-conic, not larger than the thorax, the edges of the segments obscurely edged with lurid yellow, more visible on the sides, and

\* Fab. Syst. Piez. p. 266. no. 68.

† Ibid. p. 279. no. 45.

‡ Ann. and Mag. Nat. Hist. vol. vii. p. 315.

§ Reaum. vol. vi. pl. 20.



forming four fasciæ on the belly: wings yellowish at the base, deepest on the costa; stigma bright ochreous; nervures pale brown: knees, anterior tibiæ, tips of the others and all the tarsi ochreous. Length  $5\frac{1}{2}$  lines; expanse 11.

The nest of this wasp (fig. 8) appears to have been suspended from a tree by a twig not much more than  $\frac{1}{8}$ th of an inch in diameter (*o*); it is 8 inches long and 15 in circumference at the broadest part (fig. 9), and weighs 19 ounces. It is pear-shaped, being ovate at the top and truncated, but convex at the bottom, and on the outer margin is a hemispheric tubercle pierced with a circular hole a little more than half an inch in diameter, the margin being thickened and rounded; the entire surface is rough and coated with fine reddish earth and sand, and there are various dark spots, possibly from some liquor exuding from the cells, or it may have been occasioned by berries falling upon it or other casualties. This nest is composed of such substantial materials that no wet could penetrate it, neither would it break if it were to fall from the branch; and the position of the entrance and its form are admirably adapted to protect the inmates, to keep off the wet and sun, as well as for the egress and ingress of the community. By the external undulations I can trace four layers of comb; and on shaking the nest numbers of the neuters, perfect and imperfect, have fallen out; but I cannot detect either males or females. I doubt not, from its external form and appearance, that its internal structure is very like that of *P. nidulans* figured by Reaumur. As the nest is a unique example, I have not ventured to divide it lest it should fall to pieces and be destroyed.

I will now proceed to characterize a nearly allied species, of which there were a multitude of neuters contained in the same collection. It is related to *M. brunnea*, and very probably builds a similar nest, but I can nowhere find it described.

##### 5. MYRAPTERA ELEGANS, Curt.

Sericeo-nigra, capite thorace abdomineque lincis cingulisque fulvis, tibiis tarsisque ochraceis.

*Description*.—Silky black; mandibles quadridentate: antennæ ferruginous beneath towards the apex; edge of clypeus and inner margin of eyes, also the outer margin extending round the base of the head, yellow; edge of collar and of thorax, two parallel lines down the back, a line across the scutel, four long spots on the metathorax, and an oblique spot under each wing, bright yellow: petiole elongated, turbinate, slender at the base, with

a minute tubercle on each side at the middle, the extremity only  $\frac{1}{3}$ rd as broad as the abdomen, the margin yellow as well as that of all the abdominal segments, the basal one the brightest: wings yellowish; costal and subcostal cells yellow; stigma ochreous, with a fuscous streak extending to the apex: tips of thighs and of all the tibiæ and tarsi bright ochre. Length  $4\frac{3}{4}$  lines; expanse  $9\frac{1}{4}$ .

This wasp is more elegant in form than *M. brunnea*, and its head, thorax and abdomen are prettily and neatly marked with slender yellow lines; its abdomen is more pointed, and the stings are often exerted. It appears to be related to the *P. pygmæa*, Fab.\*, but I expect the legs of that insect are black.

In order to facilitate the study of these curious creatures, I will add a list of the nine species I have found described, now forming four genera, which must be established upon the structure of the trophi, for no assistance can be derived from the form of the antennæ or the neuration of the wings.

1. Abdomen with the petiole short and gradually increasing.

1. POLISTES GALLICA, *Linn.*, Panz. 49. 22. Europe.
2. P. ACTÆON, *Hal.*, Linn. Trans. vol. xvii. p. 323: the nest is similar to the foregoing. Brazil.
3. P. AFRICANA, *Pal. de Beauv.* pl. 8. f. 4. Kingdom of Oware.

2. Petiole very short and abruptly increasing: thorax truncated behind.

4. EPIPONE NIDULANS, *Fab.* Guêpe cartonnière, *Reaum.* vol. vi. pl. 20–24. *E. chartaria*, *Lat.*—*Coq. Icon.* t. 6. f. 3. *Guer. Icon.* pl. 72. f. 7. Cayenne.
5. E. LECHEGUANA, *Lat.* Brachygaster analis, *Perty*, in Spix and Martius, *Dclectus*, pl. 28. f. 6. The Honey-bee of Brazil and Mexico.

3. Petiole elongated and clavate: thorax abruptly truncated.

6. CHARTERGUS (*St. Farg.*) MORIO, *Fab.* G. Tatua, *Cuv.* Cayenne.

4. Petiole elongated and clavate: thorax sloping behind.

7. MYRAPTERA SCUTELLARIS, *White, Am. & Mag. Nat. Hist.* vol. vii. p. 315. pl. 4. f. 4–7. Brazil.
8. M. ELEGANS, *Curt. suprâ*, p. 257. Brazil.
9. M. BRUNNEA, *Curt. suprâ*, p. 256. Brazil.

\* *Syst. Piez.* p. 280. no. 53.

EXPLANATION OF THE PLATE.

TAB. XXXI.

- Fig. 1. *Dielocerus Ellisii*, mas.  
Fig. 2. Ditto fem.  
    *a.* The labrum of the female.  
    *b.* The mandible.  
    *c.* The maxilla.  
    *d.* The palpus.  
    *e.* The mentum.  
    *f.* The palpus.  
    *g.* The labium.  
Fig. 3. Nidus formed by the caterpillar.  
Fig. 4. Interior surface of a portion of ditto.  
    *h.* The woolly covering.  
    *i.* The cells lying horizontally.  
Fig. 5. Longitudinal section of a nest, exhibiting the cells with the exuviae of the caterpillars.  
    *k.* The surface next the tree.  
Fig. 6. Transverse section of the last, divided at *k, l*.  
    *m.* An operculum removed from  
    *n*, which shows where the imago escapes.  
Fig. 7. The caterpillar.  
Fig. 8. The nest of *Myraptera brunnea*, Curt., figured  $\frac{1}{4}$ th of the natural size.  
    *o.* The twig by which it is suspended.  
    *p.* The entrance.  
Fig. 9. The bottom of the nest.  
Fig. 10. *Myraptera brunnea*, neuter magnified,  
    *q*, the natural dimensions.